

Couples' Immigration Status and Ethnicity as Determinants of Breastfeeding

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Breastfeeding is widely regarded as the optimal feeding strategy on the basis of its numerous advantages for mother and child.^{1–5} Despite these benefits, nearly 30% of US infants are never breastfed, and two thirds of those are not being breastfed at 6 months, the American Academy of Pediatricians—recommended minimum age.^{5–7} Low-income women in particular are at increased risk of not breastfeeding.^{8–14} Mothers who are younger (particularly teenage mothers); those who had low-birthweight babies; those who participate in the Women, Infant, and Children Special Supplemental Program (WIC); and those with lower educational status are all less likely to breastfeed.^{15,16}

Yet socioeconomic status is not completely determinate of breastfeeding behaviors. For example, Hispanics, who tend to have low educational achievement and household incomes, breastfeed at rates higher than their levels of socioeconomic disadvantage would indicate. Hispanics have twice the poverty rates of non-Hispanic White households,¹⁷ yet similar proportions of Hispanic and White mothers breastfeed.⁶ Conversely, Hispanics and non-Hispanic Blacks have comparable poverty rates,¹⁷ yet the latter are between 27% and 37% less likely to breastfeed.^{6,16} Rates of breastfeeding among Hispanic mothers appear to be only weakly correlated with socioeconomic status.

Hispanic breastfeeding behaviors may be evidence of the “Hispanic paradox,” the phenomenon in which health outcomes of Hispanics are better than their income levels would indicate in comparison to other populations with comparable socioeconomic status.^{18–20} Despite their lack of financial resources, Hispanics have low rates of premature birth and infant mortality.^{19,21–24} Proponents of the paradox believe that low levels of acculturation may protect some Hispanics from engaging in damaging American health behaviors^{24–26}

Objectives: We investigated how couples' immigration status and ethnicity determined the decision to initiate breastfeeding and to breastfeed at 6 months.

Methods: From data collected on 4207 mothers and 3013 fathers participating in a longitudinal birth cohort study, we used linear regression and covariate-adjusted proportions to estimate the determinants of breastfeeding behaviors. The sample was divided by immigration status (either foreign born or born in the United States) and further subdivided by ethnicity (Mexican Hispanic, non-Mexican Hispanic, and non-Hispanic).

Results: Mothers born in the United States had an 85% reduction in the odds of breastfeeding as compared to foreign-born mothers and a 66% reduction in the odds of breastfeeding at 6 months. Each additional year of US residency decreased the odds of breastfeeding by 4%. These differences by immigration status were seen for Mexicans, other Hispanics, and non-Hispanics.

Conclusion: The Hispanic paradox may extend to other non-Hispanic immigrants for breastfeeding behaviors, but may not be true for Hispanic mothers born in the United States. Low rates of breastfeeding for Hispanic American mothers indicate that they should not be overlooked by breastfeeding promotion programs. (*Am J Public Health.* 2006;96:641–646. doi:10.2105/AJPH.2005.064840)

(also R. Kimbro, S. Lynch, and S. McLanahan, unpublished data, 2004).

However, beyond the well-documented finding that non-Hispanic Blacks are less inclined to breastfeed,^{6,9,16} little attention has been paid to the importance of race and ethnicity in evaluating breastfeeding behaviors. It is therefore unknown whether other immigrant mothers who are similar in socioeconomic status to Hispanics have comparable breastfeeding rates²⁷ and how differences in country of origin may influence breastfeeding. Additionally, although surveys indicate that Hispanic mothers breastfeed at rates similar to those of non-Hispanic Whites, those surveys do not distinguish between immigrant and nonimmigrant Hispanics. As a consequence, it is possible that the Hispanic paradox applies only to Hispanic mothers who immigrated to this country, but that US-born Hispanic mothers have breastfeeding rates commensurate with their lower socioeconomic status.^{22,27} Furthermore, the Hispanic paradox literature has concentrated on Mexicans, so it is unknown if the paradox applies to non-Mexican Hispanic mothers.

We used data from a large cohort of mothers to analyze the association between ethnicity and immigration status on breastfeeding behaviors. Data came from the Fragile Families and Child Wellbeing Study,²⁸ a longitudinal survey of approximately 4800 new parents conducted in the late 1990s. First, we analyzed how breastfeeding behaviors differ by immigration status, examining breastfeeding as a function of nativity, ethnicity, and years of residency in the United States. Second, we compared breastfeeding rates among mothers who are in 1 of 3 ethnic groups (Mexican Hispanic, non-Mexican Hispanic, or non-Hispanic) but differ in terms of their immigration status.

Our study contributes to the breastfeeding literature in 4 important ways. First, no previous study has analyzed how immigration status affects breastfeeding behaviors for Mexican, non-Mexican Hispanic, and non-Hispanic immigrants. Immigrant behaviors are of increasing importance in understanding the well-being of children, given recent estimates that nearly 20% of all US children live in immigrant households.²⁹ Second, we compared the

relative influence of ethnicity as opposed to immigration status in order to see which may be a more important factor in determining breastfeeding. Third, we used data collected from both parents, providing information on the importance of paternal ethnicity and immigration status. Finally, our longitudinal data set, which included information on a wide set of sociodemographic measures, reduces (but does not eliminate) the likelihood of finding a spurious association between breastfeeding behaviors and our key independent variables.

METHODS

Data came from the Fragile Families and Child Wellbeing Study.²⁸ This sample includes 4898 new births (roughly three quarters of whom are nonmarital) in 75 hospitals, 20 cities (Austin, Tex; Baltimore, Md; Boston, Mass; Chicago, Ill; Corpus Christi, Tex; Detroit, Mich; Indianapolis, Ind; Jacksonville, Fla; Milwaukee, Wis; Nashville, Tenn; New York, NY; Newark, NJ; Norfolk, Va; Oakland, Calif; Philadelphia, Pa; Pittsburgh, Pa; Richmond, Va; San Antonio, Tex; San Jose, Calif; and Toledo, Ohio), and 15 states throughout the United States. The survey was designed to measure both maternal and paternal influences on child well-being, and it is unique among large, longitudinal data sets in that it includes information collected directly from both the mother and the father. Baseline interviews with mothers and fathers were conducted shortly after the child's birth. Mothers were interviewed in person in the hospital within 48 hours of the birth, and fathers were interviewed in person as soon as possible thereafter, either in the hospital or wherever they could be located. Hospitals were chosen to approximate birth patterns within each city, and nonmarital births were oversampled. Data were collected by a professional research firm, in conjunction with Princeton and Columbia Universities. We used data from the baseline interviews collected between February 1998 and September 2000 and from the first round follow-up, conducted either by phone or in person approximately 12–15 months later.

Of the original 4898 mothers, we excluded those who did not complete the follow-up survey ($n=533$), were not living with their child ($n=54$), had twins ($n=81$), or had missing

information on the measures of breastfeeding and race and ethnicity ($n=23$) for a final sample size of 4207 mothers. In comparison to the 691 mothers not in our sample, the 4207 observed mothers had higher education levels and household incomes, were more likely to be married, were younger, were less likely to engage in risky pregnancy behaviors, and were more likely to be born in the United States. Fewer fathers completed the survey than mothers, but for measures of paternal age, education, and race, we used mother-report of these variables if the father was not surveyed. Mothers were not asked about fathers' immigration status, so models including paternal immigration are smaller ($n=3013$).

We used logistic regression and covariate-adjusted proportions to estimate the differences in breastfeeding behaviors by ethnicity and immigrant status. Covariate-adjusted proportions, similar to multivariate regression, produce estimates that have been statistically adjusted to account for the influence of independent variables and can be derived from either regression or analysis of covariance models. In order to test for statistical differences between proportions, we also used logistic regression models. In these models, one group was chosen as a reference category (e.g., foreign-born Hispanics), and the other categories were entered as dummy variables. For any comparisons not directly tested by the regression, we used Wald tests to conduct pairwise tests of equality. Standard errors in the regression models were adjusted for possible nonindependence of observations within city using Huber–White standard errors.³⁰ All analyses were conducted using the statistical package Stata (Stata Corp, College Station, Tex).

To account for missing data, we used multiple implementation procedures available in Stata. When data are considered “missing at random,” as was the case here, multiple imputation provides consistent and efficient estimates and is preferred over other missing data techniques, such as listwise deletion or simpler imputation methods.^{31,32} In this procedure, missing data are imputed on the basis of their correlations with nonmissing data. The imputation is done repeatedly, producing n number of data sets. Analyses are then done on each data set, and the results are

pooled to produce estimates and standard errors that have been adjusted for the multiple imputation procedure. We did not have variables with high degrees of missing information. Three of our independent variables were missing information on 2.6% of the cases; 8 other independent variables were missing information on less than 1% of the cases.

Two measures of breastfeeding behavior were used: if a mother ever breastfed, and if she did so, if she breastfed for at least 6 months. We classified immigrant mothers as those mothers who were born outside of the United States. For immigrant mothers, we also measured years of US residency. Race and ethnicity classified mothers as non-Hispanic White, non-Hispanic Black, Hispanic, or other race (i.e., Asian, Pacific Islander, or Native American). In our adjusted proportion models, we further subdivided Hispanic mothers into those who were Mexican as opposed to those who were of other Hispanic origin. Mothers who were born in Puerto Rico were classified as being born in the United States, a point we return to subsequently.

To control for potentially confounding characteristics, we included the following maternal characteristics: marital status, age, education (high school diploma or general equivalency diploma, some college, and bachelor's degree and higher), if first birth, employment (worked part or full time at any point during year before baby's birth), income (as measured by the log of the income-to-needs ratio: the household's total income divided by the poverty line threshold for the household's size), and health behaviors (baby was low birthweight, saw doctor in first trimester, or smoked during pregnancy). Additionally, we controlled for paternal age and education status and if father's race differed from the mother's. Models also included a dummy variable for city of residence (results not shown). All of the measures, save for breastfeeding behaviors, were measured during the baseline survey. Information about breastfeeding was collected at first follow-up. The measures were self-reported.

Descriptive statistics for all measures are presented in Table 1. The sample was 27% Hispanic, 22% non-Hispanic White, 47% non-Hispanic Black, and 4% other race or ethnicity; 16% were born outside the United

TABLE 1—Demographic and Descriptive Statistics: Fragile Families and Child Wellbeing Survey, 1998–2001

	Mean
Ever breastfed	0.57
Breastfeeding at 6 mo ^a	0.36
US born	0.84
Years in United States, mean (SD) ^b	9.83 (7.70)
Single	0.75
Hispanic	0.27
Non-Hispanic White	0.22
Non-Hispanic Black	0.47
Other race	0.04
Father is different race	0.15
Age, mean (SD)	25.1 (6.02)
Age (father), mean (SD)	27.8 (7.19)
First birth	0.39
High school or general equivalency diploma	0.30
Some college	0.25
College degree or higher	0.11
High school or general equivalency diploma (father)	0.34
Some college (father)	0.22
College degree or higher (father)	0.10
Income to needs ratio, mean (SD)	2.25 (2.41)
Worked part-time year before birth	0.11
Worked full-time year before birth	0.68
Low birth weight	0.09
Smoked during pregnancy	0.19
Saw physician 1st trimester	0.82
Observations	4207

Note. All characteristics refer to mother unless stated otherwise.

^aAmong the 2387 mothers who ever breastfed.

^bAmong the 674 foreign-born mothers.

States. More than half (57%) of mothers breastfed, and only about one third (36%) were still breastfeeding at 6 months. Rates for breastfeeding initiation were slightly lower than those found in national surveys, perhaps reflecting the oversampling on nonmarital births in the Fragile Families survey.^{7,8,17}

RESULTS

In comparing breastfeeding behaviors for immigrant versus nonimmigrant participants (Table 2), we found that immigrants were

TABLE 2—Odds Ratios (ORs) for Breastfeeding Behaviors, by Demographic Characteristics: Fragile Families and Child Wellbeing Survey, 1998–2001

	Ever Breastfed OR (SE)	Breastfed at least 6 mo OR (SE)
US born	0.150 (0.038)**	0.344 (0.072)**
Years lived in United States	0.958 (0.015)**	0.971 (0.014)*
Single	0.669 (0.081)**	0.692 (0.098)**
Non-Hispanic Black	0.699 (0.109)*	1.069 (0.132)
Non-Hispanic White	1.207 (0.270)	1.035 (0.115)
Other race	0.849 (0.171)	0.560 (0.181)
Mother, father different race	1.084 (0.131)	1.448 (0.224)*
Age	0.979 (0.008)**	1.010 (0.010)
Age (father)	1.009 (0.008)	1.008 (0.010)
First birth	1.149 (0.067)**	0.698 (0.083)**
High school or general equivalency diploma	1.201 (0.124)	0.962 (0.153)
Some college	2.012 (0.267)**	1.140 (0.195)
College or higher	2.822 (0.672)**	1.824 (0.354)**
High school or general equivalency diploma (father)	1.125 (0.117)	1.117 (0.158)
Some college (father)	1.547 (0.161)**	1.198 (0.170)
College or higher (father)	1.897 (0.444)**	1.657 (0.324)
Income-to-needs ratio (log)	1.056 (0.050)	0.960 (0.047)
Worked part-time year before birth	1.361 (0.148)**	0.953 (0.138)
Worked full-time year before birth	1.210 (0.119)	0.839 (0.107)
Low birth weight	0.850 (0.095)	0.583 (0.107)**
Smoked during pregnancy	0.689 (0.051)**	0.609 (0.087)**
Saw physician 1st trimester	1.191 (0.096)*	0.889 (0.139)
Observations	4207	2387

Note. Omitted categories: Hispanic, no high school or general equivalency diploma, no employment in year before birth. Models include 19 dummy variables for city of residence; coefficients not shown. Standard errors have been adjusted to reflect possible nonindependence of observations within cities.

* $P < .05$; ** $P < .01$.

significantly more likely to breastfeed than were nonimmigrants. Mothers born in the United States had an 85% reduction in the odds of breastfeeding (OR=0.150, $P < .01$), and a 66% reduction in the odds of breastfeeding at 6 months (OR=0.344, $P < .01$). Furthermore, there was a negative effect of length of residency for immigrants, as an additional year of living in the United States was associated with a 4% decrease in the odds of breastfeeding (OR=0.958, $P < .01$) and a 3% decrease in the odds of breastfeeding at 6 months (OR=0.971, $P < .05$).

As for race and ethnicity, there were no significant differences between Hispanic and non-Hispanic Whites. However, non-Hispanic Blacks were significantly less likely to initiate breastfeeding than were Hispanics (OR=0.699, $P < 0.05$), but there were no differences

between Blacks and Hispanics in breastfeeding at 6 months.

The rest of the model is consistent with previous research,^{8–12} as there were pronounced differences in breastfeeding rates by socioeconomic status and health behaviors. Mothers who were unmarried, less educated, had partners who were less educated, were less attached to the labor force, and engaged in more risky behaviors during pregnancy (i.e., smoked or did not see a physician during the first trimester) were less likely to breastfeed. For breastfeeding at 6 months, there were negative associations between marital status, maternal education level, and smoking during pregnancy, but there were no differences by labor force attachment.

To consider paternal influence, we used the same models as described previously,

TABLE 3—Covariate-Adjusted Proportions of Breastfeeding Behaviors, by Immigrant Status and Ethnicity: Fragile Families and Child Wellbeing Survey, 1998–2001

	Ever Breastfeeding				Breastfeed at Least 6 mo, OR (SE)			
	All	Mexican	Non-Mexican Hispanic	Non-Hispanic	All	Mexican	Non-Mexican Hispanic	Non-Hispanic
Immigrant participants	0.89	0.91	0.89	0.85	0.54	0.59 _x	0.59 _y	0.40 _{xy}
Observations of immigrant participants	674	301	147	226	575	258	125	192
US-born participants	0.52	0.53	0.47	0.53	0.30	0.24	0.21 _y	0.32 _y
Observations of US-born participants	3533	347	347	2839	1812	194	174	1444

Note. Scores with the same subscript letter (x or y) differ significantly in pairwise comparisons ($P < .05$). Adjusted proportions controlled for race, age, parity, marital status, education, income, employment status, low birthweight birth, pregnancy behaviors, and city of residence.

replacing mother's immigration status and years lived in the United States with that of the father's. Having a partner born in the United States decreased the odds of breastfeeding initiation by 83% (OR=0.170, $P < .01$), and for every year that a father lived in the United States, a mother was 5% less likely to breastfeed (OR=0.949, $P < .01$). Likewise, a US-born father was associated with a decrease in breastfeeding at 6 months (OR=0.470, $P < .01$), and for every year a foreign-born father lived in the United States, the odds of breastfeeding at 6 months decreased by 2% (OR=0.981, $P < .01$). We also ran models that included the citizenship measures for both parents. For breastfeeding initiation, we saw little change in significance levels, with the exception of maternal years of residency, the P value of which increased to 0.085 (the correlation between paternal and maternal years of residency was 0.37, $P < .01$). For breastfeeding at 6 months, only the maternal measure of immigrant status remained significant. To test for moderating effects, we generated interaction terms between maternal and paternal immigration status; however, they were not significant for either breastfeeding outcome.

Breastfeeding Behaviors of Immigrant Participants

We next analyzed how breastfeeding behaviors differed by country of origin and Hispanic ethnicity. Within both the immigrant and nonimmigrant groups, we compared breastfeeding rates between Mexican, non-Mexican Hispanic, and non-Hispanic mothers (Table 3). The proportions were adjusted for

the same covariates as were used in the regression models. The first set of columns presents results for breastfeeding initiation; the second presents results on breastfeeding at 6 months. The "non-Hispanic" category includes both non-Hispanic Whites and Blacks, two groups that in the United States have very disparate breastfeeding rates. However, analyzing foreign-born Whites and Blacks was not possible due to small sample sizes, so we combined these groups in the "US-born, non-Hispanic" category to be consistent. We controlled for race in the adjusted proportion models to address this concern.

The results of our analyses on breastfeeding initiation were consistent with our regression results and indicate that immigrant mothers breastfed at much higher rates than did nonimmigrant mothers. Overall, nearly 9 of 10 immigrant mothers breastfed compared with 1 of 2 nonimmigrant mothers. Yet, although the differences between immigrant groups were large, the differences within immigrant group were relatively small and non-significant. Among immigrant mothers, for example, 91% of Mexicans, 89% of non-Mexican Hispanics, and 85% of non-Hispanic mothers breastfed. For US-born women, the corresponding rates were 53%, 47%, and 53%, respectively.

The results on the odds of breastfeeding for at least 6 months were similar. Rates for immigrant mothers were high; for Mexicans and non-Mexican Hispanics, rates were more than twice those for nonimmigrant participants (e.g., 59% of Mexican immigrant mothers breastfed for at least 6 months compared with 24% of Mexican nonimmigrants).

Among immigrants, non-Hispanics were significantly less likely to breastfeed than were either Mexican or non-Mexican Hispanics. Among mothers born in the United States, non-Hispanic mothers breastfed at higher rates than did non-Mexican Hispanics.

We also considered the breastfeeding rates of Puerto Rican mothers, who, perhaps more than any other Hispanic group, straddle both Hispanic and US cultures. Our group of Puerto Rican mothers was small ($n=154$), and only 22% ($n=34$) were born in Puerto Rico. Breastfeeding rates did not differ significantly between Puerto Rican mothers born in Puerto Rico and those born in the United States. The rates of breastfeeding initiation (59% for Puerto Rican mothers born in Puerto Rico, 54% for Puerto Rican mothers born in the United States) were comparable to those observed for US-born mothers.

DISCUSSION

We used data from the Fragile Families and Child Wellbeing survey to consider the role of ethnicity and immigration status in determining breastfeeding behaviors. Our work was motivated by evidence that shows that, except for Hispanic women, low socioeconomic status is strongly and negatively correlated with breastfeeding.^{8–10} Our results indicate that, for certain immigrant groups, other factors besides economic well-being influence the decision to breastfeed.

We draw two main conclusions. First, residence in the United States is associated with a decrease in breastfeeding behaviors. For both mothers and fathers, being born outside the

United States increased the odds that their child would be breastfed. Additionally, there is a negative effect of living in the United States: for every year a foreign-born mother or father resided in the United States, the odds of breastfeeding decreased by 4%. Second, we found larger differences in breastfeeding rates by immigrant status than by ethnicity. Nearly 90% of all immigrant mothers breastfed, and those that were Mexican or non-Mexican Hispanic were twice as likely to breastfeed as those who were of a similar ethnicity but born in the United States.

Our evidence regarding the Hispanic paradox is mixed. Consistent with the hypothesis, foreign-born Hispanic mothers had very high levels of breastfeeding, even though nearly two thirds (64%) did not graduate from high school and had incomes that were 155% of the poverty line (results not shown). Yet their US-born counterparts, despite a better socioeconomic profile with higher high school graduation rates and household incomes, were half as likely to breastfeed. This suggests that immigration status may be a more important factor in determining breastfeeding than is ethnicity.

In fact, because we found no difference in breastfeeding initiation for non-Hispanic and Hispanic immigrants, the Hispanic paradox may be true of other immigrant groups. Previous research indicates that, across a variety of ethnicities, immigrant children have higher birth weights and lower mortality rates than do US-born children.^{33,34} Unfortunately, our sample of immigrants was too small to analyze mothers by particular country of birth, but our results suggest that this is a fruitful area for further research.

Our findings indicate that 2 populations, Hispanics born in the United States and fathers, should not be overlooked in breastfeeding promotion efforts. Only half of all US-born Hispanic American mothers breastfed, and only 1 in 5 were still breastfeeding at 6 months. Hispanic children may be disadvantaged by poverty and could benefit from the physiological benefits that breastfeeding provides. However, Hispanic mothers born in the US have not received a great deal of attention from researchers, because their rates of breastfeeding are usually combined with foreign-born Hispanic mothers.^{6,16} Additionally, very

little research has considered how fathers may influence breastfeeding behaviors. They should not be ignored, because paternal immigration status is significantly and positively correlated with breastfeeding initiation.

Differences between foreign-born Hispanics and those born in the United States are consistent with previous research. A retrospective study using birth certificate data from nearly 10 000 Mexican mothers in Washington State found that those born outside the United States had a decreased risk of having a premature birth.³⁵ Likewise, a study from the Hispanic Health and Nutrition Examination Survey (HHANES) found that second-generation Mexican Americans had higher rates of low birthweight births.²⁵

Although a very crude measure for cultural assimilation, findings indicating a negative association between United States residency and breastfeeding are consistent with previous results that document a negative effect of adopting American behaviors and values on the health outcomes of Hispanic mothers.^{19,24,26,36,37} These studies have primarily concentrated on outcomes other than breastfeeding, but a study by Kimbro and colleagues (R. Kimbro, S. Lynch, and S. McLanahan, unpublished data, 2004) using data from the Fragile Families study, found that higher scores on an acculturation scale were negatively correlated with breastfeeding behaviors for Mexican mothers.

Some limitations to our study should be noted. First, the mothers observed in our final sample were relatively more advantaged than mothers for whom we did not have outcome data. As a result, we may be overstating breastfeeding rates. We were also more likely to observe mothers born in the United States than those born outside the United States, which may bias our results as well. Second, our data do not provide any indication as to why breastfeeding rates may differ or why residency in the United States may have such a detrimental effect. Additional research is needed in order to understand the causal pathways that determine breastfeeding. Third, our models may suffer from omitted variable bias. Although we tried to control for a broad set of characteristics, there may be other factors that we failed to include. Fourth, the Fragile Families survey was not designed to

specifically examine breastfeeding among Hispanics. The survey contains a relatively small number of Hispanics ($n=1142$), and, given the important cultural heterogeneity among this group, further work is needed in this area.

We found variation in breastfeeding behaviors according to the parents' immigrant status. We suspect that these differences are influenced by how breastfeeding is perceived in the United States as opposed to other countries. For immigrant women, breastfeeding may be the common and expected method of feeding. In contrast, women born in the United States may view breastfeeding as just 1 of multiple feeding options.³⁸ Thus, US women may feel more discretion about the choice to breastfeed, and, in the absence of a culturally mandated norm, many may choose not to breastfeed. ■

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Contributors

C.M. Gibson-Davis developed the study hypothesis, analyzed the data, and wrote the article. J. Brooks-Gunn developed the study hypothesis, assisted with data analysis, and reviewed drafts of the paper. Both authors helped to conceptualize ideas and interpret findings.

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